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ABSTRACT

Gender differences in taking advanced science courses and the characteristics of schools that affect course taking by high school girls were studied using data from the High School Effectiveness Study, a supplement of the National Longitudinal Study of 1988. The sample consisted of 3,430 students who attended 184 high schools between 1988 and 1992. Data were analyzed using hierarchical linear modeling to partition the variance in the outcome to the within-group and between-group parts. As the percentage of females in a coeducational school increases, the average level of science course taking in that school decreases slightly, though significantly. The gender gap is more pronounced for Catholic schools. When not controlling for any other variables, the gender gap is most severe in private schools, but when controls are made for academic pressure and the availability of Advanced Placement (AP) courses, the gender gap in other private schools is not significant. Using aggregate measures of students' life goals and educational expectations did not significantly affect the gender gap. Results indicate that school academic pressure differentially affects male and female science course taking. In schools with higher academic pressure, females do not take the more advanced science courses. Implications for decreasing the gender gap in course taking are discussed. (Contains 3 figures, 4 tables, and 23 references.) (SLD)

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Differential Effects of School Academic Pressure on the Gender Gap in Science Course Taking

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Traditionally, males have dominated the "hard" sciences particularly the physical sciences. Nationwide, only 22 percent of all employed scientists and engineers are women, although women constitute 45% of the work force (National Science Foundation, 1996). The underrepresentation of women in scientific courses and careers has received both public and academic attention.

Results of the Second IEA Science Study in the United States showed differences in science achievement favoring boys for all grade levels (5 to 12) (IEA, 1988). Gender differences in science achievement occurs as early as middle grades, and the gap increases as students progressed in school (Jones, Mullis, Raizen, Weiss, & Weston, 1992; Burkam, Lee, and Smerdon, 1997). There is considerable evidence supporting the fact that females take fewer advanced science courses than males and this lower level of course taking has influence on achievement in science (Oakes, 1990; Sadker & Sadker, 1994). In the United States, students have considerable latitude about which science courses to take in high school and when to take them (Clune & White, 1992). The differences in mathematics and science course taking has been identified as a major contributor to gender differences in science achievement and as a major factor for low representation of females in science professions (Oakes, 1990), Several studies have indicated that after controlling for coursework, the gender gap in mathematics and science achievement are substantially smaller (Berryman, 1983; Kimball, 1989; Oakes, 1990; Pallas & Alexander, 1983). Without the right high school courses, science courses in college are out of reach; and without college courses, females are kept out of careers that remain overwhelmingly male. Understanding the reasons behind the gender gap in science course taking may help in crafting interventions designed to increase female science achievement and female representation in advanced sciences, thus providing equitable schooling for females and promoting more equitable gender representation in science professions.

Regarding the factors that contribute to the differential achievement and participation of boys and girls in mathematics and science, research interest has frequently been focused on individual variables, including the differences between boys and girls in attitude, interest, motivation and spatial skills (Fennema & Leder, 1990; Leder, 1992; Simpson & Oliver, 1985, 1990). Research focusing on school variables examines teacher expectation, teacher-student interaction and classroom environment (Burkam, Lee, and Smerdon, 1997; Crossman, 1987; Eccles, 1989; Eccles, MacIver, & Lange, 1986; Jones & Wheatley, 1990).

This study focuses on school factors, in particular on academic pressure in schools. Peterson and Fennema (1985) found that competitive classroom climates are helpful to boys' academic achievement, but detrimental to girls' achievement. Cognitive gains for girls are negatively related to competitive interactions and positively related to the opportunities for individualized or cooperative learning. Eccles et al. (1986) found that girls in competitive classrooms have less positive attitudes toward mathematics than boys, while few or no gender differences were found in classrooms with few social comparisons and competition. Studies have also shown that with little or no emphasis on individual competition, girls' interest and participation in mathematics and science increased (Campbell, 1995). Based on these findings, we hypothesized that there would be differences among schools in the relationship between gender and advanced science course taking. Specifically, we hypothesized that high academic pressure in schools that emphasized competition for grades and pressured students to achieve would hinder female students from taking more advanced science courses, and thus would increase gender gap in science course taking.

In sum, this paper explores gender differences in advanced science course taking and the characteristics of schools that affect course taking by high school girls. In particular, we examine the effect of school academic pressure on female's science course taking. Our research questions are as follows:

1) Is there variation in science course taking between schools?

2) Does science course taking vary between males and females?

3) Does the relationship between gender and science course taking vary between schools?

4) What school characteristics influence science course taking and which characteristics explain the variation in course taking for females?

Method

Sample

The data used for this paper come from the data set of the High School Effectiveness Study (HSES), a supplement of the National Longitudinal Study of 1988 (NELS: 88). NELS: 88 is a nationally representative study on students' educational and personal development, with data collected in the 8^{th} (1988), 10^{th} (1990), and 12^{th} grade (1992). HSES expanded the first (1990) and second (1992) follow-up surveys of NELS: 88. It is representative of American urban and suburban high schools. There are 3430 students who attended 184 high schools between 1988 and 1992 in the sample. We created an aggregate variable that represented the proportion of females in each school ("PROFEM"). Eleven of the schools in this sample were all female, and 14 schools were all male. In order to keep as many schools as possible in the analysis, we assigned means for the missing data of two school-level predictors, i.e., the number of full-time science faculty, and the aggregate variable representing the level of academic pressure (see below for further explanation of this procedure). There are 2747 students who attended 158 coeducational high schools between 1988 and 1992 in the sample. On average there are 17 students in each school. It is important to note that the single sex schools that were excluded from this investigation had higher mean science course taking (M = 4.22, SD = 1.00) than the mean for coeducational schools (M = 3.97, SD = 1.19). The results of this study cannot be generalized to single sex schools (or to rural schools).

Student--level Variables

We selected 5 variables in level 1--student level: level of science course taking by 12th grade (outcome variable), the overall GPA at 9th grade, gender (dummy coded for females), minority, and socioeconomic status.

(1) Science course taking (SCIPIPE): This is a 7-level measure of science coursework created by the University of Michigan researchers. This variable indicates students' highest level of completed science coursework in high school. The categories of it are as following:

0 None

1 Secondary physical sciences, basic biology

2 General biology 1, secondary life sciences, honors and general biology 2, advanced biology

3 Chemistry or physics 1

4 Chemistry 1 and physics 1

5 Chemistry 2 or physics 2

6 Chemistry 2 and physics 2

We standardized this variable. Its distribution is close to normal.

(2) Overall GPA at ninth grade (ALLGPA9): One would expect that students with higher ability levels would be more apt to take higher level courses than those with lower ability. Because there are no standardized achievement scores for 8th grade in this data set, we chose the overall GPA at 9th grade as the variable to control for ability. We standardized this variable, and got a mean score of 0 and standard deviation of 1. The distribution of this variable is close to normal.

(3) SES (S2SES1): This is a composite of student's socio-economic status, including family's income, parents' educational level, and parent's occupational status. Previous studies show that SES is an important predictor of achievement. Students from families with lower income, lower parental educational level and lower occupational status achieve lower than students with higher SES. This should be particularly apparent in science learning with students from higher SES families having increased opportunities to learn about and develop an interest in science through involvement in such things as science camps, computer programs simulating science experiments, ... Therefore they

are more likely to take more advanced science courses. This variable is also standardized. The distribution of the composite of SES is close to normal.

(4) Gender (FEMALE2): This is a dummy coded variable, with female coded as 1. 49% of the students in this sample are female.

(5) Minority status (Minority): We recoded the Race variable (S2RACE) to combine black, Hispanic and American Indian students into a minority group, and the white and Asian American students into a non-minority group. Although Asian American also represents a minority, Asian Americans have performed in school culture in ways more similar to mainstream white students and thus we included them in the non-minority group. Thirty-two percent of the sample are minority students.

School-level Variables

Five school-level variables are selected for our level 2 model.

(1) Availability of AP science courses (APSCI). We created this variable (1= AP science course offered, 0= AP science course not offered) by first creating a dummy coded variable at the student level indicating those students who were at level 6 on the science course taking. We aggregated this dummy coded variable to school level, and then created a school level dummy variable. Any school that had at least one student at level 6 was designated as offering AP science courses. If there were no students in a school at level 6, then the school was assumed not to offer AP science. In the full sample (single sex and coeducational), 52% of the public schools, 38% of Catholic schools, and 68% of other private schools offer AP science courses.

(2) School classification (G12CTRL2): We dummy coded this variable into Catholic (1 = CATHOLIC) and other private schools (1 = OPRIVATE) with public

schools coded as 0. Our sample is composed of 82% public schools, 9% Catholic schools, and 9% other private schools. Public schools may have the opportunity to offer more advanced science courses than Catholic or private schools. On the other hand, Catholic and private schools usually offer only a college preparatory curriculum and so we expected that more students (both male and female) would take chemistry and physics in these schools. We hypothesized that females would take more courses in Catholic and private schools because these schools would be more likely to have smaller classes (more intimate) and more mentoring available.

(3) School size (S1C2): This is total student enrollment as of October 1989. Since this variable is positively skewed, we log-transformed it to approximate normal distribution, and then z-scored it. The distribution of the z-score is normally distributed. Smaller schools would likely offer fewer science courses, but similar to Catholic and private schools, these schools might offer a narrow curriculum leading students to higher science courses.

(4) Number of full-time science faculty (ZLNFTST derived from S2C36B1): Eight schools were missing variable S2C36B. In order to determine types of school they are, we listed the 8 schools by sector, average SES, whether they are technical/vocational schools, etc. We hypothesized that if they were vocational schools, they might not have full-time science teachers. However, none of them were technical/vocational schools. We plugged in means for all 8 missing schools according to their size, sector, and average SES. Then we transformed and standardized it. The number of full-time science faculty could affect both the number and type of courses a school could offer in science as well as the size of the science classes (student-teacher ratio in science classes).

(5) Academic pressure (SCHPRESS). This variable is factor score created from the following variables:

Students place high priority on learning

Classroom activities are highly structured

Teachers press students to achieve

Students are expected to do homework

Students are encouraged to enroll in academic classes

Students are encouraged to compete for grades.

The reliability on this factor is .80 (alpha coefficient). This factor explains 52% of the variance on these variables. Higher values indicates that the students in that school feel more pressured by school faculty to achieve in school. We hypothesized that females might respond more negatively to the pressure to perform and take fewer advanced courses in an effort to alleviate this pressure. The score represents the mean response on these variables when data was available for a minimum of three of the items. We plugged means for the schools missing data (N = 28) based on the school size, sector, and school average SES quartiles.

All continuous school level variables were standardized after weighting.

In order to match the data files at the student and school level, the school ID at both levels was selected. We also included weight (SCHLWT) variable at the school level to adjust the sample to be more representative of the national urban and suburban school population. Because no missing data are allowed at the school level, we selected only those schools, not missing on any school level variables (after having plugged means for those variables that we knew had some missing data). As noted above, schools that were either all male or all female (i.e., single gender) were excluded. The analyses were based on 158 coeducational schools. The descriptive statistics of student-level variables and school-level variables are shown in Table 1.

Insert Table 1 here

HLM Analytic Models

Our research questions are ideally suited for analysis using Hierarchical Linear Modeling [HLM] (Bryk & Raudenbush, 1992). HLM partitions the variance in the outcome to the within group and between group parts.

Fully unconditional model

The first step in HLM is the fully unconditional model, which is the simplest hierarchical linear model. It is equivalent to a one-way ANOVA with random effects. The fully unconditional model specifies no predictors at either the student level or the school level. It estimates the grand mean and partitions the variance of the outcome into within school variance and between school variance. For fully unconditional model, the level-1 model is

$$Y_{ij} = \beta_{0j} + r_{ij}$$

The level-2 model is

$$\beta_{0j} = \gamma_{00} + u_{ij}$$

For this study, the level-1 outcome variable is the highest level of the student's science course taking by the 12th grade. From the fully unconditional model, we can find out the proportion of the total variability in students' science course taking that lies between schools. This is indicated by calculating the Intraclass Correlation Coefficient (ICC), which represents the between group variance as a proportion of the total variance.

Within-school model

The within-school model, which is also called the "Random-Coefficient Model" includes student level predictors of the outcome. No level-2 predictors are estimated in this model. It tells us the average relationship between the outcome and level-1 predictors, and the variability of the relationship across schools. We can also find out the proportion of within-group variance in the outcome that has been explained by level-1 predictors.

We use student level variables as level-1 predictors of science course taking. The equation is as follows:

$$Y_{ij} = \beta_{0j} + \beta_{1j}\,(\text{GENDER}) + \beta_{2j}\,(\text{MINORITY}) + \beta_{3j}\,(\text{SES}) + \beta_{4j}\,(\text{ALLGPA9}) + r_{ij}$$

In which, Y_{ij} is the student's science course taking.

β_{0j} : The average science course taking of 12th graders in an individual school adjusted for SES, minority status, gender and initial ability distributions in that school.

β_{1j} : The average effect of gender on science course taking across schools controlling for SES, minority status and initial ability.

β_{2j} : The average effect of minority status on science course taking across schools controlling for SES, gender, and initial ability.

β_{3j} : The average effect of students' SES on science course taking across schools controlling for gender, minority status and initial ability.

β_{4j} : The average effect of overall GPA in ninth grade on science course taking across schools controlling for gender, minority status and SES.

We used group-mean centering for gender, because we are interested in modeling this at the school level. We group-mean centered gender in the Random-Coefficient Model, we allow this parameter to vary randomly across schools and we set it free. Thus, we could find out whether the relationship between gender and science course taking varies between schools, and in the between school model examine what characteristics of schools would explain this variance. The control variables, such as SES, minority and the overall GPA at ninth grade, are centered around grand means and these slopes are fixed to be constrained across all schools.

The within-school model also provides estimates of covariance between the within-school intercept and slopes, and the proportion of within-group variance that has been explained by the student-level predictors.

<u>Between-school model</u>

Using the between-school model, we tried to explain why students in some schools take more advanced science courses, and why the gender gap in science is larger in some schools than in others. Therefore, we modeled both the intercept and the gender/course taking slope. The models are as follows:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\,(\text{CATHOLIC}) + \gamma_{02}\,(\text{OPRIVATE}) + \gamma_{03}\,(\text{ZLNSIZE}) +$$

$$\gamma_{04}\,(\text{ZLNFTST}) + \gamma_{05}\,(\text{APSCI}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}\,(\text{ZSCHPRES}) + \gamma_{12}\,(\text{CATHOLIC}) + \gamma_{13}\,(\text{OPRIVATE}) +$$

γ_{14} (APSCI) + u_{1j}

In the first model,

β_{0j} is the average science course taking after controlling for Level 1 predictors (the intercept of the within school model).

γ_{00}: The average science course taking for students in a public school with average SES, average size, average number of full-time science faculty that do not offer AP science courses.

γ_{01}: The effect of Catholic schools on average science course taking after controlling for other level 2 variables.

γ_{02}: The effect of other private school on average science course taking after controlling for other level 2 variables.

γ_{03}: The effect of school size on average science course taking after controlling for other level 2 variables.

γ_{04}: The effect of number of full-time science faculty on science course taking after controlling for other level 2 variables.

γ_{05}: The effect of availability of AP science courses on science course taking after controlling for other level 2 variables.

In the second model,

β_{1j} represents the average gender gap in science course taking across schools.

γ_{10}: The average gender gap in public schools that do not offer AP science courses after controlling for school academic pressure.

γ_{11}:. The average effect of academic pressure on the gender gap controlling for availability of AP science courses and sector.

γ_{12} : The average effect of Catholic school on the gender gap controlling for availability of AP science courses, sector, and level of academic pressure.

γ_{13}: The average effect of other private school on the gender gap controlling for availability of AP science courses, sector, and level of academic pressure.

γ_{14}: The average effect of availability of AP science courses on the gender gap in course taking after controlling for sector and level of academic pressure.

At level 2, we used grand mean centering for continuous variables in order to standardize them, and no centering for dummy variables. Although a variable such as the number of full time science faculty should have an easily interpretable unit, in this case we had to log transform the variable in order to normalize the distribution making it more difficult to interpret the results unless we used standardized units.

Results

The Fully Unconditional Model

158 schools are included in the analysis. The Intraclass correlation coefficient is .273. That means 27.3% of the total variance in student's science course taking occurs between schools, while 72.7% of the total variance exists among students within schools. The final estimate of within school variance in student science course taking is .66, and the estimation of between school variance is .25. The reliability of the estimated parameter is .703. After taking into account the reliability, the adjusted ICC is .348. Thus, adjusted for the reliability, 34.8% of the total variance in student's science course taking lies between schools. The result of chi-square shows that student's science course taking

varies significantly between school ($p<.001$). Thus it is possible to examine the school effect on student course taking, i.e., to build the model at the school level.

The within-school model

In the random coefficient model we examined student level effects on course taking. We modeled the effect of being female on course taking behavior, and controlled for minority status, SES, and initial ability.

Females take significantly fewer advanced science courses when minority status, SES and initial ability are taken into account. The relationship between females and science course taking varies significantly among schools ($p = .043$). The estimated variance of the slopes for female is .05 with a chi square of 188.554 with 157 degrees of freedom.

The random-coefficient model results are summarized in Table 2.

Insert Table 2 here

The level 1 predictors explained 29.0% of the average within school variance in twelfth grade science course taking. The reliability of the estimate of the school mean course taking is .695, and the reliability of the estimated relationship between gender and science course taking is .233. The precision depends on the sample size and the variability of that predictor within that school. The within school sample size averages 17 students.

The correlation between the intercept and the gender slope is -.092, which means that as course taking increases the slope (i.e., relationship between gender and science course taking) becomes more negative, i.e., the gender gap is larger in schools with higher average course taking .

Between School Model

Again, the main purpose of our investigation is to seek what school characteristics influence science course taking and which characteristics explain the variation in course taking for females. Our results show that the average science course taking is significantly affected by both structural and contextual variables. Students in larger schools do not advance as far in science after controlling for sector, the number of science teachers, and the availability of AP science courses. The number of full-time science faculty and the availability of AP science courses increase the level of advanced science courses that students take after controlling for sector and school size. In addition, students in other private schools take significantly more advanced science courses than public school students after controlling for the school size, number of full-time science faculty, and availability of AP science courses (see Table 3).

Insert Table 3 here

Our final model examined the relationship between academic pressure, sector, availability of AP science courses and the gender gap in science course taking. As noted above, we expected that the gender gap in Catholic and private schools would be attenuated. Our results indicate that after controlling for academic pressure and availability of AP science courses, the gap in science course taking between males and females in Catholic schools remains larger than the gap between males and females in public schools. However, the gender gap in other private schools is no longer significant once the availability of AP science courses and school academic pressure are taken into account. As expected, increasing academic pressure in schools significantly increases the gap between male and female course taking, particularly after controlling for availability of AP science courses. Although availability of AP courses does not have a significant relationship with the gender gap in science course taking, it highlights the relationship between academic pressure and the gender gap in science course taking. In the model without AP course availability the effect of academic pressure is not significant and the effect of other private schools is significant (see Table 4). After controlling for sector, females in schools with higher academic pressure take slightly fewer advanced courses in science ($p < .10$) (see Table 3). Figure 1 to Figure 3 visually demonstrate the differential effects of school academic pressure on the gender gap in science course taking in public, Catholic and other private schools.

Insert Table 4 and Figure 1, 2, and 3 here

We tried a number of other variables that we hypothesized would affect the female/course taking relationship, but none were significant in predicting the gender slope in any of the models we tried. School size, number of full-time science faculty, average science course taking in a school, variance in science course taking, the proportion of females in the schools (an aggregated variable), and higher incidence of belief in traditional values (an aggregate of student level factor score) were not significant in explaining the variance in the gender gap. We removed them from our model in order to conserve the degrees of freedom.

Discussion and Conclusion

We were very surprised to see the effect of Catholic and other private coeducational schools on advanced science course taking for females. We expected that the narrower college preparatory curriculum offered in most Catholic and other private schools would decrease the gender gap. In addition, Catholic high schools tend to have more female science faculty than public high schools. We thought that the increased likelihood of having a female science instructor would increase the number of advanced science courses that a female high school student would take (due to more similar communication styles and the role model effects). When we initially found the effect for the Catholic and other private schools, we thought that perhaps increased academic pressure might be negatively affecting female enrollment in higher science courses. This was confirmed in our results, however, after accounting for the effects of the academic pressure and availability of AP science courses, the effect of Catholic schools on the gender gap remained significantly negative, i.e., the gap between male and female advanced science course taking is larger for Catholic schools.

As the percentage of females in a coeducational school increases, the average level of science course taking in that school decreases slightly, though significantly. The gender gap is more pronounced for Catholic schools than for public schools. When not controlling for any other variables the gender gap is most severe in private schools (see Table 1). When we control for academic pressure, and availability of AP courses, the gender gap in other private schools is not significant.

We also explored whether females in public and private schools hold more traditional values and aspire to more traditional roles (wife, mother), and therefore, do not anticipate a need for the higher sciences. Using aggregate measures of students' life goals and educational expectations did not significantly affect the gender gap.

Our results indicate school academic pressure differentially affects male and female science course taking. In schools with higher academic pressure, females do not take the more advanced science courses, while males do take these courses. Academic pressure is higher in private and Catholic schools than in public schools. Previous research has consistently shown that most girls prefer and take a more active role in cooperative, rather than competitive, learning activities (Baker, 1990; Eccles, 1989; Kahle, 1990). Cooperative learning can improve girls' academic achievement, yet these cooperative activities did not hinder boys' attitudes or achievement (Oakes, 1990). This is consistent with our findings. If the level of pressure is moderated for females, our results suggest that the gap in science course taking between male and female students will decrease. In order to close gender gap in science achievement and participation, schools should put more effort in creating a less competitive environment that benefits both female and male students.

However, the schools with the highest academic pressure also had the most advanced science course taking. Further research is needed to investigate the elements of academic pressure that hinder girls from taking more courses. As more Charter Schools are formed, some will try to emulate the successes of the other private schools. It is important that they not also reproduce increased gender inequities.

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Table 1

Means of Variables for Males and Females in Public, Catholic, and Other Private Schools

	Public School		Catholic School		Other Private School	
	Male	Female	Male	Female	Male	Female
N	1104	1072	98	95	214	184
Student Level Variables						
Science course taking	-.13	-.09	-.10	-.15	.75	.46
Socio-Economic Status	-.27	-.28	.12	-.08	1.04	1.07
Percentage of minority	.36	.37	.30	.32	.06	.13
Initial ability	-.12	.11	-.29	-.27	.05	.30
School Level Variables						
Number of schools	132		7		19	
School size	1810		983		724	
Full-time science faculty	4		3		3	
Academic pressure	-.22		.02		.33	
AP Science course %	.52		.38		.68	

*Sample sizes presented in this paper are unweighted. Analyses were conducted using the weighted variables.

Table 2.
Results from the Random-Coefficient Model

Fixed Effects	Coefficient	se	t ratio
Overall mean science course taking	-.030	.039	-0.765
Female- science course taking slope	-.136	.038	-3.570***
Mean minority- science course taking slope	-.114	.040	-2.842**
Mean SES- science course taking slope	.154	.019	8.043***
Mean ninth grade GPA-science course taking slope	.424	.015	28.089***
Random Effects	**Variance**	**df**	**χ^2**
Mean of school mean science course taking	.167	157	1284.301***
Mean female- science course taking slope	.053	157	188.554*

*p<.05 , **p<.01 , ***p≤.001 .

Table 3.
Results of Final HLM Between School Model

Fixed effect	gamma coefficient	se	t ratio
Average course taking across schools			
Base (Public school)	-.26	.053	-4.944***
Catholic school	.080	.156	.514
Other Private school	.451	.119	3.784***
School size	-.116	.056	-2.072*
Full-time science faculty	.185	.055	3.353***
Availability of AP courses	.323	.071	4.532***
Random Gender gap			
Base	-.141	.056	-2.508*
School academic pressure	-.075	.037	-2.003*
Catholic school	-.288	.140	-2.061*
Other private school	-.227	.119	-1.906
Availability of AP courses	.096	.072	1.337
Fixed minority differentiation	-.092	.040	-2.28*
Fixed SES differentiation	.132	.019	6.765***

Fixed initial ability	.424	.015	28.249***

Random effects	Variance	df	chi-square
Intercept (u_{0j})	.115	152	868.707***
Gender slope (u_{1j})	.031	153	176.518

*p<.05 , **p<.01 , ***p<.001 .

Table 4
Results of HLM Between School Model

Fixed effect	gamma coefficient	se	t ratio
Average course taking across schools			
Base	-.094	.040	-2.348*
Catholic school	.029	.166	.177
Other Private school	.513	.125	4.095***
School size	-.111	.059	-1.881
Full-time science faculty	.223	.058	3.861***
Random Gender gap			
Base	-.088	.038	-2.323*
School academic pressure	-.066	.037	-1.781

Catholic school	-.338	.136	-2.494*
Other private school	-.243	.118	-2.054*
Fixed Minority differentiation	-.107	.040	-2.661**
Fixed SES differentiation	.138	.019	7.097***
Fixed initial ability	.425	.015	28.201***

Random effects	Variance	df	chi-square
Intercept (u_{0j})	.135	153	1006.001***
Gender slope (u_{1j})	.030	154	176.030

*p<.05 , **p<.01 , ***p<.001 .

Figure 1 Science Course-taking among Males and Females in High and Low Academic Pressure Schools (Public)

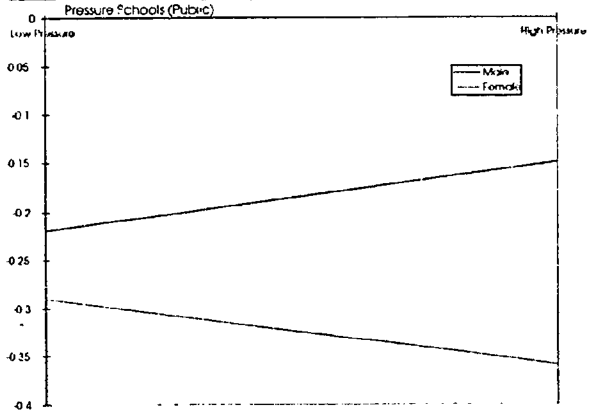

Figure 2. Science Course-taking Among Males and Females in High and Low Academic Pressure Schools (Catholic)

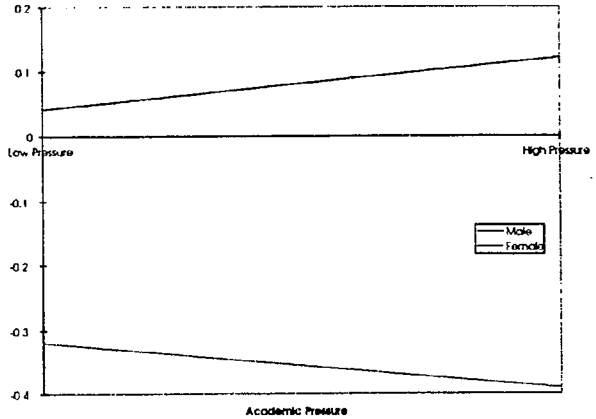

Figure 3. Science Course-taking Among Males and Females in High and Low Academic Pressure Schools (Other Private)